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# CLINICAL LECTURES

ON SOME OF THE

## PRINCIPAL DISEASES OF THE EYE.

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### CATARACT.—*Continued.*

GENTLEMEN! The Eye Speculum, or Ophthalmoscope, is an illuminating instrument which serves for examining the illuminated interior parts of the eye, and thus distinctly shows organic changes of the aqueous humor, of the lens and its capsule, of the vitreous humor, the retina, and choroidea, when unobservable by the naked eye. The necessity of such an instrument is obvious, if we reflect that the retina is almost entirely concealed from view to the naked eye. Various contrivances and modifications of them have been introduced for this purpose.

Helmholtz devised this speculum, which consists, as you observe, of *reflectors*, to illuminate the retina, and a *concave lens*, to bring its structure within our focus of vision. The reflectors are four parallel and well-polished slips of glass, which are fixed close by an open frame, which is fastened down by screws to the sides of a short square tube. One end of the tube is cut obliquely to form an angle of  $56^{\circ}$  with the base or other end. The exterior is bronzed, the interior lined with black velvet. A diaphragm and a biconcave lens, No. 12, are placed at the base, and secured by a hollow eye-piece, which can be screwed off and on so as to allow the lenses to be changed.

*Method of using it.*—The patient should be seated in a dark room; a good oil or gas lamp should be placed on his side, on a level with his eyes. The reflectors must be turned towards the eye to be examined (the pupil should be dilated by atropine), and must be adjusted so as to throw the light in the direction of the axis of the instrument on the eye to be observed. The observer, having closed one eye, looks through the biconcave lens, and is thus enabled to see the interior of the eye illuminated. The rays of light, on leaving the convex surface of the cornea, are convergent; but the observer's eye can only bring to a focus slightly convergent or parallel rays; the necessity, therefore, for interposing a concave lens in order to disperse the rays before entering the observer's eye, is evident. By some

management of this instrument, if the eye to be examined is turned inwards, you may see in the healthy eye the blood-vessels of the retina and the entrance of the optic nerve, which is recognized by its brilliant white color; it is not always easy to detect it, and some practice is required in the use of this instrument in order to bring them into view. Round about the optic nerve the color of the retina is clearest, and becomes darker towards each side. If the eye of the patient is directed inwards, the papilla nervi optici may be detected.

Coeuius invented a speculum more suited to show the interior structure and changes of the eye. It consists, as you see, of a perforated mirror and a lens. The rays of light from a gas, or better, an oil lamp, are concentrated by the lens and thrown on the mirror. This is held before the eye to be examined, and the rays are thrown through the pupil on to the retina. The unabsorbed rays return in the same direction, and are received by the eye of an observer, which is behind the mirror, on the spot where it is perforated. The rays of light are reflected at an angle upon the mirror, and are conveyed to a focus on the retina by the media of the eye; the unabsorbed rays return on leaving the eye to the mirror whence they came, and are also received by the eye of the observer.

*Method of using it.*—The pupil of the eye having been dilated by atropine, the patient and surgeon are seated, as in the use of the other speculum. The mirror is held opposite the eye to be examined, the lens must be adjusted so that a bright concentrated light should be seen to fall on the pupil. The surgeon now applies his eye to the back of the mirror. This instrument must be held at different distances from the eye, until the retina is exposed to view, and its parts clearly seen by different movements of the eye. You see now the whole pupil illuminated by the concentrated light; if you interpose between the eye of the patient and the mirror, convex lens of one and three-quarters focus, at a distance of one inch, you will readily distinguish the magnified vessels, and see clearly the white, shining optic nerve. The lens must be held at a shorter distance from the eye than its focus is, in order to make allowance for the space from the cornea to the retina. An interposed biconvex lens will show the vessels clearly defined, but diminished. Its adjustment requires practice and patience. More manageable and simpler in its construction is the

#### *Ophthalmoscope of Klaunig.*

It consists of a perforated, biconvex lens of fourteen inches focus, is thirty-five millimetres in diameter, and is provided with a blackened hole of four and a half millimeters—one side of the lens is covered with foil and framed in a dark frame, to which a handle is attached. The best mirror for reflecting concentrated light is a concave one; but this causes an intense

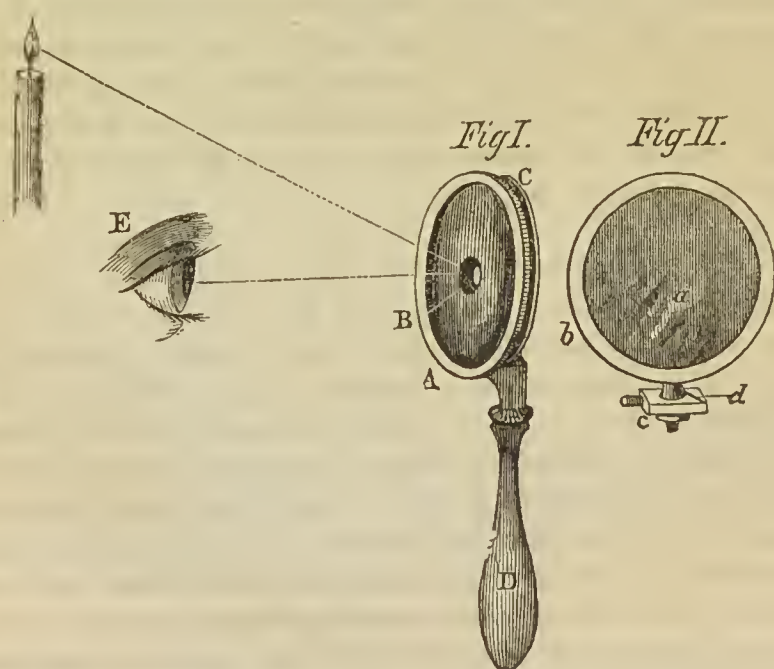
and disturbing reflection from the cornea, and dazzles the eye of the patient; but in connection with a biconvex lens, the rays of light are broken twice by entering and leaving the lens; consequently, the divergent rays of light will be removed and the intensity of the flame thus diminished. In its effect, this mirror is equal to a concave mirror of three and a half inches focus.

*Mode of using it.*—In a dark room, or a place well shaded, the patient and surgeon may be seated, the light, oil or gas lamp, is to be placed on the opposite side of the eye to be examined; the speculum should be held about three and a quarter inches from the eye, in such a manner as to reflect the rays of the light and to throw them through the pupil on to the retina. The apex of the cone of light thus formed should fall behind the pupil, which, if it be a small one, must be dilated by atropine. I prefer the gas light to be placed above and behind the patient. As the mirror has to be adjusted and turned in different ways, the observer's eye is exposed to its influence, and the patient's eye is not sufficiently shaded when it is placed on the side. The observer applies his eye to the back of the mirror, the hole.

The application of it is more convenient, as you see, when the light is placed above and a little behind the head of the patient, as the mirror may be held directly opposite the eye without being turned sideways in order to illuminate it. By its use the slightest opacities may be detected and traced, be they in the lens or capsule or aqueous humor. The vessels, of course, will be invisible if there exists an opacity of the lens to a greater extent; however, even if the opacity may not be as yet traceable, and some change still exists in the transparent media, the greatest difficulty will be found in bringing the vessels into view. I examined several cataract patients with this speculum but a few days ago, and I readily distinguished the opacities situated in the lens and those of the capsule. In one instance, a woman, about forty years of age, I could trace the opacity from the centre towards the periphery. The opacity formed a tripartite division of the lens, which could be seen even without the use of a magnifying glass. In another individual the opacity could be detected on the periphery of the capsule, in form of longitudinal streaks, situated close to each other and presenting the appearance of eye-lashes turned downwards and outwards. In the right eye of the same old man, there were opacities in the form of round spots on the capsule; and at the same time a synechia posterior, confined to one spot, where the uvea of the iris was connected with a part of the lower margin of the lens, was distinctly visible by application of the magnifying glass before the eye speculum. The latter individual was also subjected to the examination by the use of Coccius' speculum. I had some difficulty in tracing the vessels, as they were partly masked by the opacity of the lens; the other reason may be that my Klau-nig's speculum was deprived of the foil in some parts near the hole, and



thus the intensity of the reflection was diminished. If concave glasses are applied before the eye to be examined, the vessels in the healthy eye may be readily distinguished, although diminished, still more defined. The distance at which Klaunig's mirror has to be applied, generally depends upon the extent of the hole in the mirror and the extent of the pupil. In order to illuminate the eye it is necessary to throw some concentrated rays of light, emanating from the centre of the mirror, around the hole; the shadow, therefore, of the hole, together with some concentrated rays of light, must be thrown into the interior of the eye; consequently, the more dilated the pupil is, and the smaller the hole in the mirror, the nearer may the mirror be brought to the eye; whereas, the larger the opening in the mirror, and the smaller the pupil, the more will it be necessary to remove the mirror from the eye, and the more will the mirror exert a dazzling influence upon the patient. If you bring the mirror too close you will be misled, especially if you look at the eye by a wax-candle, to mistake one of the images of the flame, if bright and almost appearing white, for the entrance of the optic nerve if brought in a certain direction; on the other hand, you must be careful not to consider the depicted mirror in the eye to be the appearance of the nerve.



*Fig. I.*—A, a biconvex lens; B, the hole; C, the frame; D, the handle; E, the patient's eye.

*Fig. II.*—a, the plane mirror; b, the frame; c, the horizontal piece to be fixed to the first mirror; d, indicating the line to turn the mirror in an angle of forty-five degrees.

Klannig has devised an improvement on his speculum, which consists in a second mirror, to be brought as near as possible to the first, in such a direction that a line drawn from the retina through the hole of the mirror should meet the centre of the second mirror, which is placed vertically to this line, but in its horizontal direction, at an angle of forty-five degrees. Instead of the observer, the second plane mirror receives the image, which can be seen readily without any exertion. A magnifying or diminishing glass will reproduce the image accordingly, if applied instead of the second plane mirror.

Klaunig used a stronger convex glass, of eight inches focus, for this purpose, as he preferred observing closely under the influence of a stronger light. He asserts that by this means draughtsmen and those less accustomed to similar examinations, are enabled to see clearly the images. In examining myopic eyes, the refraction of their media has to be corrected by the application of a presbyopic glass, in order that the image on the retina should appear clearly defined.

The examination of the eye requires a good deal of patience and endurance, but if practised for some time, the surgeon acquires a certain ability in it, and considers it less difficult. However, great caution is required in the use of all eye specula. Nothing is more injurious than protracted examinations of the eye, for both ophthalmic surgeon and patient. The latter may, in consequence of the examination, if often repeated and protracted, acquire an additional injury from the over-exertion from the reflected strong light on the retina. Nothing is more calculated to weaken the sight and produce amblyopic and amaurotic symptoms than similar experiments and examinations, if injudiciously made.

### *Varieties of Cataract.*

*Black cataract* is a rare occurrence; it is the hardest of the lenticular cataracts; when dropped into a glass the same resounds. It is apt to be confounded with amaurosis, but may be readily distinguished from the latter by the activity of the pupil, which is absent in amaurosis, or modified, being very sluggish in its movements, if there exist any at all. Further, the examination by the speculum will show the opacity of the lens in black cataract, and transparency of the same in amaurosis.

Frequently, the lens becomes lessened in volume by a natural process of absorption; the more it shrinks the more the capsule contracts upon it and shrivels up. The capsule thus shrunk, thickened, and corrugated, may contain a diminished lens (*cataracta arida siliquata*). The lens may be absorbed in consequence of an injury inflicted upon the eye (traumatic cataract), or a needle operation performed on it: a membranous or capsular cataract may remain, which, according to its density, may present a scarcely

discernible film, or appear chalky or milky; ordinarily it is unequal in its extent. The opaque membrance, consisting of the two parts of the capsule closely situated, may be connected with the ciliary body, or more or less separated from it. If entirely separated from the ciliary body, it may oscillate backwards and forwards during the movements of the eye (shaking cataract), or float behind the iris (floating cataract), or even pass into the anterior chamber. A calcareous or bony transformation of the capsule and the lens may take place. Desmarres, of Paris, and White Cooper, of London, and others, observed similar ones.

Secondary cataracts are formed in consequence of needle operations, and may be lenticular, capsular, or capsulo-lenticular.

Spurious cataracts are formed as products of previous or existing inflammation of the iris, choroidea, ciliary body, retina, or capsule, and may be

(a) Fibrinous.

(c) Sanguineous.

(b) Purulent.

(d) Pigmentous (uvean).

(a) The *fibrinous cataract* is the result of an inflammation of the iris and the capsule, and is deposited in the latter in the pupil, sometimes pushing forwards into the anterior chamber more or less connected with the iris. It presents a white spot, mixed with yellowish points or tubercles.

(b) The *purulent cataract* is formed by a collection of organized pus in the pupil, where a thick, unequal, wrinkled mass is visible, connected entirely with the pupil, which is immovable. The iris is discolored, and often shows marks of a previous chronic inflammation. At the same time, an organized hypopion is met with in the anterior chamber. Vision is entirely gone, and little hope remains for its restoration.

(c) *Sanguineous cataract* developes itself in consequence of wounds inflicted upon the eye, or in consequence of spontaneous ruptures of the vessels (apoplexy) in the eye. The anterior chamber, or only the pupil, is filled up with a dark brown, almost black mass, which shows *gray* prominences in some of its parts.

(d) *Pigmentous (uvéenne) cataract* \* presents a dark brown or black opacity, which is formed by the uvean pigment deposited in the pupil on the fibro-albuminous product, which covers the capsule, partially or in its whole extent. The pigmentous cataract adheres sometimes to the iris in one or more points. Sometimes it is formed only in the centre of the cap-

\* Desmarres.



sule, and is not connected with the iris, which then retains its natural movements. This form of spurious cataract is produced by a traumatic inflammation of the eye, chiefly if iritis is associated with it; when the inflammation may extend from the iris to the capsule, or it may be caused by an inflammation spreading from the capsule to the iris. The following circumstances contribute much to the formation of a spurious uvean cataract and its being situated in the pupil. In internal inflammation of the eye, chiefly iritis, the vessels of the iris are gorged with blood, the iris develops itself in thickness from forwards backwards, and in its superficial extent; the parenchyma of the iris thus enlarged, causes a diminution of the pupil (which lasts as long as the anomalous state of the iris exists), and approaches the capsule, which underwent the same changes as the iris; and thus tends to meet, as it were, the iris. The greater the vascularity and inflammation of both, the easier is the adhesion effected. Besides, the form of the posterior chamber being such as to permit a nearer approaching of the centre of the iris than of its periphery to the capsule, it is evident that it facilitates the formation of an adhesion. The pigment or uvea is developed on a larger surface in consequence of the extension of the parenchyma of the iris. If the secreted organizable lymph is deposited in abundance, and the internal inflammation lasts a long time, the adhesion between the iris and capsule will be a permanent one, thus producing a *syncchia posterior*. But if, on the contrary, the fibro-albuminous deposit is formed in a small quantity and becomes slowly organized, and at the same time the turgescence of the vessels disappears with the inflammation of the iris, the latter will tend to resume its natural movements, by retracting towards the ciliary margin. It will result in this struggle with this badly-organized new formation, that the false membrane will give way by degrees, and will thus give rise to the formation of longer or shorter fibro-albuminous threads, covered on their anterior surface with pigment, connected in front with the iris and backwards with the capsule; or, in other instances, the false membrane being firmly connected with the capsule, will retain some parts of the uvea, the pigment which the iris lost in its tendency to resume its normal position and left on the capsule; and by withdrawing thus from the connection with the capsule, a pigmentous cataract will be formed, without connection with the iris.

Vision is more or less altered, according to the extent of the uvean deposit on the capsule and the obliteration of the pupil; the patient retains always the perceptibility of light and darkness.

Pigmentous cataract may be confounded with black cataract and amaurosis, and may be distinguished by the following symptoms:—

*Pigmentous(uvean)cataract.*

The *pupil* is immovable in the complete pig. cat.; is adherent, and presents a more or less irregular form. By application of atropine, it may *not* dilate at all, or do so irregularly.

The *color* of the pupil is seldom perfectly black; the color of the uvean pigment is unequally dark-brown, and mixed with blackish threads formed by the false membrane covered by the pigment.

Internal inflammation of the eye always precedes or coexists.

No shadow of the iris, if adhesion exists with the capsule to a greater extent.

By examination with eye speculum, opacities are observable in front of the lens.

*Black cataract.*

The *pupil* is movable, as in the normal state.

The *color* of the pupil is seldom perfectly black; the lenticular opacity is black—duller in the centre than in the periphery.

No previous inflammation of the internal structure of the eye.

A shadow of the iris is visible on the capsule.

Opacity in the lens.

*Amaurosis.*

The *pupil* is round or elliptic, and not attached to the capsule by black threads, thus producing a more or less anomalous form of the pupil.

The black color of the pupil is formed, as in the normal state, by the back ground of the globe behind, and not in the pupil.

Inflammation of the eye mostly absent; often, it may have existed, or be present

No opacity in the lens or capsule. The red color of the choroidea mostly equally diffused, deposits on the chor. or retina sometimes visible.

Adhesions of the pupil are produced in consequence of internal inflammations of the eye. Change of color in the iris is usually noticeable. Change of the structure of the retina, and loss of sight, may be caused by the same inflammation. The presence of such an adhesion (synechia), demands always some consideration in the choice of the operation.

*Maturity.*—If a cataract has been forming for a long time, without an altered state of the other transparent media and textures of the eye, it is not absolutely necessary to await the complete change or maturity of the cataract. If, however, the cataract is the result of a still-existing inflammation or congestion in the eye, it is not advisable to operate upon it, but it is preferable to wait till the change has been completed.

*Complications* may exist, as purely local ones, as alterations of the structure of the iris, choroidea, retina, vitreous humor; or general ones—the constitution being in a depressed state, or an unhealthy condition of some nature may exist in one of the principal organs. Similar complications have to be regarded and consulted in the choice of an operation, as well as of the time.

*Treatment.*—As long as the eye may be rendered serviceable, be it by application of atropine or by the use of an eye-glass, the ophthalmic sur-



geon is not justified in performing an operation for cataract on it. I recollect two cases under my treatment while attached to the German Hospital in London, in both of whom a partial opacity of the capsule demanded the instillation of atropine, which produced sight available for ordinary purposes. The one was a German seamstress, about twenty-five years of age, with circumscribed central opacities in both capsules. The other was a refugee, about forty years of age, with a central opacity in the left lens. Vision of the right eye was entirely gone—its textures disorganized. Both used the atropine for about ten and fifteen months, and continued in its use about twelve months ago, when I last saw them.

If we except the traumatic cataract, which, together with some of the spurious cataracts, is often amenable to medical treatment, we generally must have recourse to a surgical treatment in order to remove a cataract.

Although many ancient and modern ophthalmic surgeons pretend to have removed spontaneous idiopathic cataracts of the lens, by applications of ammonia, veratria, etc. to the temples or top of the head, I very much doubt this being a fact. The mistake may have been in the formation of the diagnosis, if not in the assertion of the truth.

The formation of the true idiopathic cataract can neither be arrested in its development nor removed by a medical treatment. Rupture of the capsule, be it produced by a fall or shock, may expose the lens to the action of the aqueous humor, and thus the lens may become absorbed without a surgical treatment.

In young individuals, the operation for cataract may be performed in one eye while the other is sound. In older individuals, it is not advisable to expose the sound, at least yet serviceable eye, to a sympathetic risk, by operating on the affected eye—the use of the available one being sometimes sufficient for the remainder of life. If, however, the second becomes gradually worse, it is useless to await the complete formation of the cataract. Cataract in one eye often gives rise to the formation of strabismus, which, if of long standing, aggravates the beneficial result of the operation. This may be considered as an additional reason for operating in young individuals when one eye is affected with cataract.

With the exception of very hot weather, almost every season of the year may be chosen for the operation. I saw operations performed with equal success in different countries (Hungary, Germany, France, and England) in various seasons; but it is not advisable to procrastinate an operation for such a month as is generally known to be a very changeable one in weather, which is more or less peculiar to every country.

In congenital cataract it is advisable to operate in six weeks or two months after birth, in order to allow time if necessary for repetition before teething begins, and then to prevent a continual oscillation of the globes,

which often follows if light is shut out long from the retina. I saw Bowman operating in several instances. His remarks were to the effect that, however free you may move the needle for breaking up the cataract the subsequent inflammation is very small.

*Operation on both eyes on the same day.*

Jaeger, Rosas, Fabini, Roux, Guthrie, Sichel, and Desmarres, I saw operating for cataract on both eyes, on one and the same day; whereas Desmours, Dupuytren, Travers, and others, await the recovery of the operated eye before they operate on the other. The reasons for operating on both eyes on the same day are,

I. That the surgeon has to expose the patient twice to the inconveniences and accidents during the treatment, if he operates at different times, as to bleeding, vomiting (after incision), etc.;

II. That in operating on both eyes, the patient has more chance of recovering the sight, at least in one eye;

III. If the one eye is operated upon much sooner than the other, the former will, after recovery, gain a much greater relative power of accommodating the sight,\* and the last one operated on is more apt to be neglected, which may produce unequal vision;

IV. In case the result of the operation is not attended with success, the patient will less willingly and perhaps not at all submit to a second trial; whereas he will be glad to submit to a second operation if he regains the sight in the operated one.

For these reasons, I decide also on operating, on this boy, on one and the same day.

However, there are instances where it is imperative not to operate on both eyes on the same day; if, for instance, two modes of operating have to be chosen in both eyes, where the peculiar symptoms consequent upon one mode would interfere with the treatment to be selected for the other, and thus endanger the result of the operation. Those who advocate the performance of the operation at different times, assert that the risk of inflammation is greater, and often settles to a greater extent in one of the eyes, and that accidents are generally of a more serious nature.

*Preparation of the Patient.*

A good state of health is required in patients to be operated upon for cataract. Although it is superfluous, sometimes even a disadvantage, to alter the diet the patient has been accustomed to, still it is necessary that

\* Which may depend on the various combined actions of the ocular muscles, thus possibly altering the antero-posterior, horizontal, etc., diameters.

the patient should abstain a few days, previous to the operation, from fermented liquors, and sometimes from animal food too. The bowels should be evacuated the day previous, or on the same morning; but the natural functions of the stomach and bowels must not be disturbed by unnecessary purging. In plethoric individuals, general bleeding may be necessary; whereas, a state of depression or debility may induce to a corresponding previous treatment. As a general rule, it may be considered best not to operate upon a patient with a cough; nor should the ophthalmic surgeon do so on a patient with a foul tongue, or where a specific inflammation, be it a gonty, strumous or syphilitic one, is present in the eye; or if the same was recently the seat of an inflammation from whatever cause. A long interval of time should be allowed to pass before an operation is attempted in an eye thus morbidly altered. Attention has to be paid to the secretions and excretions. The urine has to be examined, whether or not deposits of uric acid and urate of ammonia are in abundance, which may be considered as symptoms of dyspepsia or fever; the presence of phosphate of lime or ammonio magnesia phosphate will denote excessive prostration, or nervous depression; and, in short, a consideration must be had of all the functions of the animal economy upon which health depends.

Advanced age is no impediment for operating; the best results follow operations performed on individuals above 90 years of age.

### *Operations.*

Extraction, Depression, and Solution or Division, are the three established general modes of operating for cataract.

Extraction consists in making an incision through the cornea, lacerating the capsule, and forcing the lens through the pupil and opening made in the cornea.

This mode of operating is applicable for *hard*, *half-hard* and *half-soft* cataracts.

To perform it, it is necessary that within reach of the surgeon should lay two or three sharp cataract knives (Wenzel's, Beer's, Jaeger's, or Guthrie's), one or two fine probe-pointed bistouries, a pair of Maunoir's scissors, curette hook, sponge, warm water, cambric rag and bandage. The room should be provided with means for darkening it.

The patient may be seated in a lower chair without a back, the surgeon opposite in a higher chair,\* while an assistant standing behind the patient, fixes (with the index and middle finger of one† hand) the upper lid to the ciliary ridge, and holds the other under the patient's chin, thus gently press-

\* Jaeger, Rosas, Arlt, Sichel, Desmarres.

† The left for the right eye, and right for the left eye.



ing the patient's head to his chest. The surgeon depresses with the index and middle finger of one hand\* the lower lid, and fixes the globe by pressing it, and holds the instrument in the other.

The light must be allowed to fall obliquely upon the patient's eye.

Or the patient is seated in an arm chair,† and leans his head backwards, the operator stands in front or behind the patient; or the patient lays comfortably on a couch, and the surgeon is seated behind the patient, and rests his elbow on the head of the couch.‡

Suppose the patient to be seated in a chair without a back, and the operation for extraction has to be performed on the left eye §; the surgeon holding the knife in his right hand, between the thumb and the first three fingers, fixes his little finger on the malar bone, and proceeds to incise the cornea, after having touched the cornea with the flat surface of the knife, to steady the eye.

The incision may be made in three different points of the cornea; or it may be pierced about its middle, close to the junction with the sclerotica at its outer side, and a semicircular flap of the cornea may be formed parallel with its margin (superior section), or the flap may be formed on its lower half (inferior section), or on its lower and outer side (exterior and inferior section).

I prefer the superior section: if this be adopted, the cornea has to be pierced with Beer's, Wenzel's, or Jaeger's cataract knife, directly (and not obliquely) close to its junction with the sclerotica, about the middle of the cornea, at its temporal side, the knife, with its cutting edge turned upwards and the flat part parallel to the iris, has to be pushed rapidly, but steadily, across the anterior chamber; the cornea then is punctured again on the opposite (nasal) side as near as possible to its junction with the sclerotica; the knife is now carried upwards very slowly,|| parallel with the circle formed by the junction of the iris and sclerotica, and thus the semi-circular flap is completed. The aqueous humor escapes when the section is completed. The upper lid must now be dropped, and the eye allowed to rest for a few moments; when the lid should be raised again. The iris will be found to bulge forward together with the cataract against the concavity of the cornea.

\* The left hand for the right eye, and right for the left eye.

† Guthrie.

‡ Bowman, Dixon, and others.

§ The pupil is to be dilated by atropine: although it contracts quickly when the anterior chamber is opened, still the iris is less in the way of the knife while it is pushed across the chamber.

|| If the knife is carried quickly, an irregular, mostly triangular flap is formed, often too small to allow the lens to escape.

The second part of the operation consists in introducing the curette, or kystotome, under the corneal flap; the concavity of the curette must be turned downwards, until the point is opposite the pupil, when the point is turned inwards and sunk through the capsule, which is divided by drawing the instrument across it in different directions: then the instrument must be withdrawn in the manner it was introduced.\* Sometimes the capsule lacerates spontaneously, in consequence of the spasmodic action of the ocular muscles, or inadvertent pressure on the eye. In such instances the use of the curette is unnecessary.

The third part of the operation, removal of the lens, is effected by directing the patient to open the eye, when a gentle pressure is made by the blunt end of the curette upon the upper lid, and a counter-pressure on the lower with the finger's end, until the lens is dislodged, and its edge rises in the pupil. The lens thus distending the pupil, passes through it, raises up the corneal flap, and escapes from the eye. The upper lid is then brought over the eye and closed, in order to prevent the escape of the vitreous humor. After a few moments, the eye must be opened, to ascertain that the pupil is round and clear, and the corneal flap in its proper place.

After the operation thus finished, the room must be darkened, the eye kept closed and covered with a piece of linen, which should be secured by a fillet around the head. The patient may now retire, or await his usual hour for retiring, but should be seated comfortably in an arm chair.

The lower section is performed by turning the cutting edge of the knife downwards, thus forming a lower semi-circular flap; the outer flap by directing the knife downwards and outwards.

Guthrie devised a plan of operating without assistants, by fixing the lids and the globe with the fore and middle fingers of one hand, and using the knife with the other.

In the progress of the operation several casualties may occur, which may require the immediate attention of the ophthalmic surgeon. The iris may fall in the way of the knife in consequence of a premature escape of the aqueous humor, produced by undue pressure on the globe: a small bit of the iris,† especially of the pupillary margin, in contact with the edge of the knife should not be regarded, the operation ought to be completed. If a second pupil be made, the isthmus should at once be divided by the blunt-pointed scissors. If, however, a considerable portion of the iris should be in

\* In the guarded curette is a sharp limb, more fitted for use than the ordinary one; the point is concealed by a little guard, so that the instrument is dull when closed; its introduction to the required spot is safe and easy; it may be opened by pressure on the trigger in the handle, and allowed to close when the pressure ceases.

† Walton.

the way of the knife, the instrument should be withdrawn; if the cornea be nearly divided, the section may be completed by introducing a secondary knife. The iris may bleed or not, this circumstance need not cause anxiety. Should the aqueous humor escape before the counter-puncture is made, the knife must be withdrawn, and the operation delayed. Imperfect counter-puncture may cause a smaller flap; the secondary knife has to be used to obviate the necessity of squeezing out the cataract, which attempt would be useless and fatal to the eye, as the vitreous humor is apt to rush out. If the vitreous humor escapes with the lens, in small quantity, no particularly bad result must be anticipated; but if the quantity be a large one, the globe collapses, and no hopes remain for the restoration of sight. The capsule may be imperfectly ruptured, and thus the free exit of the lens prevented: the introduction of the curette will be necessary to enlarge the aperture of the capsule. Hard fragments of the lens fallen in the anterior chamber, must be removed by the spoon of the curette. Many other accidents, too numerous to be mentioned now, may happen and require your immediate consideration.

After the operation, the eye must not be subjected to unnecessary examination, in order that the cornea may reunite, which takes place, generally, in from twenty-four to forty-eight hours. The surgeon must pay attention to the state of the lids during this time, and dry the lids with a sponge if any discharge exists, but should not open the eye. After three days, the surgeon may depress the lower lid and the patient raise gently his upper lid. The anterior chamber should appear filled with aqueous humor, which is a proof of reünion of the corneal flap. If neither the conjunctiva appear injected, nor the iris inflamed, the pupil be black, and the patient free from pain, the prognosis may be considered a favorable one.

The diet, which, till the fourth day, was a bland and unstimulating one, of a farinaceous kind, may now be a more supporting one; if the patient be much enfeebled or aged, beef-tea with sopped bread, may be allowed from the beginning; and solid nutriment, reduced to a pulp, may be allowed from the fifth or sixth day.

At that time, the patient may be allowed to open the eye in a subdued light, in order to test the result of the operation; he may change the bed for the arm chair, and, after a few days, walk about in the room, which should be kept ventilated, and a degree of light should be admitted that enables the patient to walk about. Sometimes the cornea unites rapidly, and the patient may recover the sight after the shortest time. The admission of light should be regulated carefully; for some weeks after the operation, he shade should be worn. Exercise should be allowed to the patient as soon as circumstances will admit it.

In a week or ten days after operation, the eye may be opened in a weak



light, and may be used more freely as it becomes stronger. The patient should be suited with eye-glasses in about a month or six weeks. By the loss of the lens, the refractive power of the eye is diminished; its place must be supplied by convex glasses. The patient should select glasses with which he can see best. Two pairs of spectacles will be necessary for him; one for ordinary vision, four inches focus, the other for reading, writing, and for other purposes requiring near sight, of two and a half inches focus, as the latter must be stronger. The patient must use them very cautiously; some weeks should elapse before he uses them freely. The result of the operation may sometimes be a less favorable one.

The most common cause of failure is acute inflammation, which usually occurs during the first twenty-four hours. Acute pain is felt in the eye-ball, then in and around the orbit; the lids swell, inflame, and are covered with purulent discharge on the border; it may terminate with thickening of the capsule of the lens, with adhesion of its divided parts, or adhesion to the iris.

Subacute inflammation is still more frequently the cause of an unsuccessful result of this operation for cataract. The subacute inflammation appears later than the acute one. It comes on a few days after the operation. The lids are of a darkish hue, and infiltrated with serum (chiefly the upper eyelid); the conjunctiva of the eye-ball is elevated by serous effusion, and presents a dull red color. Elderly persons being mostly subject to this kind of operation, are, for the same reason, liable to this asthenic form of inflammation. More generous diet and stimulant draughts may be allowed, to invigorate the constitution and thus remedy this affection.

Contra-indications to this form of operating, are, from obvious reasons, a sunken eye, a small anterior chamber, extensive adhesions of the pupil.

The white ring around the cornea (arcus senilis), which, as discovered by my friend, Mr. Canton, is a fatty change of the corneal structure, is no impediment to the extraction, if it is small. A larger arcus may heal more difficultly, as Beer asserts.

*Depression or couching.*—The patient having been prepared, as for the previous operation, his pupil dilated by atropine,\* he is placed in a low chair, while the surgeon is sitting opposite, in a higher one. The assistant fixes the upper lid, the surgeon the lower lid, and steadies the eye with one hand, using the needle with the other. After having touched the eye with the needle once or twice to steady it, the surgeon pierces with a spear-shaped or Scarpa's needle the conjunctiva, sclerotic, choroid, retina, and hyaloid membrane at a distance of a line and a half or two lines behind the margin of

\* R. Aquæ dist., Div.; Sulph. atropii. neut., gr. i.; Mucilag. sem. eyd., 3 i. M.

the cornea, nearly, but not exactly, in the middle of the eye, a little *above* its middle, as the long ciliary artery runs on each side along the middle of the eye. The needle is to be introduced on the temporal side of the globe, and its concavity placed on the convexity of the lens, after having been carried forwards and upwards. The needle must now be steadily pressed upon the cataract, so as to move it downwards and backwards out of the axis of the vision, where the needle is kept on it for a few seconds until the vitreous humor may settle over it; and then the needle is gently rotated to disengage it, and lifted up a little to see if the lens rises, when the depression is repeated; or, if it does not rise, the needle is withdrawn.

Reclination (*réclinaison*) is a modification of this mode of operating, and is effected by tilting the cataract backwards, and carrying the upper edge downwards. Hard and half-hard cataracts are best suited for this operation.

The immediate effect of depression, or reclination, is striking: the opacity in the pupil disappears at once, the globe resumes its natural appearance, and vision is restored. But there are grave objections to this mode of operating, which is justly considered by many ophthalmic surgeons a less scientific one.

The after treatment consists in keeping the patient quiet, his head being elevated, the eye shaded, his diet low for a few days. Under no circumstances should the eye be suited with glasses before the lapse of some weeks. Iritis, choroiditis, retinitis, may ensue, and must be treated accordingly.

Division, solution, or absorption, is applicable in soft and fluid cataracts. It consists in dividing the capsule, in order to admit the aqueous humor to the lens, which is effected by puncturing the cornea or sclerotic; hence the two modifications, the anterior (*keratonyxis*) and posterior (*scleronyxis*). The latter I propose to perform on this boy. The anterior operation consists in introducing a curved or straight needle through the cornea, and lacerating the capsule of the lens.

Dr. Jacobs' needle is particularly adapted for the anterior operation, which is performed by placing the patient in the usual position, and introducing the point of the needle near the margin of the cornea, or even in the centre of the cornea, as no opacity from the wound has to be anticipated. When the point of the needle is once fastened in the cornea, no action of the muscles can disengage it, and the surgeon has perfect command of the eye. The operator now pushes the needle through the cornea, to bring it in contact with the lens; and that moment the eye is apt to roll inwards so much that the pupil is hid, and the surgeon must rely upon his knowledge of the direction the needle has taken, in order to bring it to the lens. The needle is then turned back, and the capsule gently torn open by its point; then, after pricking and scratching the surface of the lens with a rotating motion of the instrument, it is withdrawn in such a manner

as not to wound the iris. If the lens is a soft and friable one, its fragments fall like snow into the anterior chamber, the operator may push the needle free into the lens, and twisting it round, mash it into a pulp.

If the cataract be a hard one, the capsule should be opened thus to admit the aqueous humor, for softening it and rendering it fit for being broken up on another occasion.

In the posterior operation, the straight needle with cutting edges must be introduced at about a line from the circumference of the cornea, through the conjunctiva, sclerotica, choroid, retina, and hyaloidea; its point should be brought forwards between the iris and the lens; the cutting edges, till now turned upwards and downwards, must be turned backwards and forwards; the crystalline lens, with its capsule, is to be thus divided by two or three gentle strokes.

The solution or absorption of the lens is accomplished more quickly in the anterior than in the posterior chamber; the fragments, however, of an opaque lens, acting as foreign bodies, being apt to produce considerable irritation and inflammation, during which resorption is suspended: caution is necessary in displacing the fragments, which if hard may, although small in size, produce great irritation, and demand immediate removal by a section of the cornea.

Sometimes a peculiar symptom follows in a few hours, generally in the night, after the operation has been performed. The patient is seized by nausea and vomiting. It is advisable to warn the patient that such may be the case. It lasts a few hours, or in some instances even a few days. Effervescing draughts, full opiates, mustard cataplasm to the stomach, and strict quiet, relieve it generally.

This symptom is, as Dalrymple observed, dependent on the poisonous presence of the contents of the capsule; for if such a cataract be removed by extraction, no such state follows. According to this view, Dixon recommends opening of the cornea, for the removal of the fluid, before pain and nausea comes on. Great relief is afforded by this means; and vomiting does not follow, as I observed in several instances, even if the patient be troubled by nausea for a short time.

The time which is required for the absorption of the lens, depends upon the circumstances connected with the nature of the cataract, and upon other individual peculiarities. In some persons the process of absorption will be a quicker, in others a slower one, although in both apparently the same circumstances may exist.

In some instances, a single operation will be sufficient; in others, a repetition of it will be necessary in order to hasten the absorption.

Some surgeons think it sufficient to repeat the operation after six or eight weeks, if there is no evidence of the resorption going on, as flattening of



the capsule and concavity of the iris. Others prefer repeating it every three or four weeks, until complete solution and absorption has taken place. Of course, as long as inflammation exists in the eye, no repetition of the operation should be had recourse to.

*Operation for capsular cataract. Secondary cataracts.*

The capsule often remains, when the lens has been resorbed, in an opaque condition, occupying more or less the pupil; thus impairing proportionately vision. Sometimes it is thin, semi-transparent, and easier lacerable; sometimes thickened, and corrugated, tough and strong. The former may be removed through the cornea, by the canula forceps; the latter, if unattached to the iris, by the larger forceps, through the cornea or sclerotica. If the capsule or a false membrane is attached to the iris firmly, greater difficulty is experienced in removing it. The pupil may be cleared by the canula scissors, which are introduced through the cornea near its circumference.

These new improvements, beautifully executed by Luer, of Paris, afford the advantage of inflicting smaller wounds in the eye. Needles for eye operations are generally made too large in size. I am inclined to believe that the success of an operation much depends upon the choice of such instruments as inflict the smallest wounds.

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